Thermodynamics ENTC 3420
Department of Mechanical Engineering
Spring 2015

A. COURSE INFORMATION
Course number/section: ENTC 3420.001 & ENTC 3420.201
Class meeting time: LEC: TR 2:00 to 3:15 p.m. LAB: TR 3:30 to 4:45 p.m.
Class location: EN 104
Lab location: EN 116
Course Website: Blackboard

B. INSTRUCTOR INFORMATION
Instructor: Andrew P. Conkey Ph.D.
Office location: EN 210
Office hours: TBD
Telephone: 361-825-2559
e-mail: andrew.conkey@tamucc.edu
Appointments: Correspond using ISLANDER email, or via BlackBoard messaging.

C. COURSE DESCRIPTION
Theory and application of energy methods in engineering; conservation of mass and energy; energy transfer by heat, work and mass; thermodynamic properties; analysis of open and closed systems; the second law of thermodynamics and entropy; gas, vapor and refrigeration cycles.

D. PREREQUISITES AND COREQUISITES
Prerequisites
PHYS 2425 - University Physics I and MATH 2414 - Calculus II
Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES

Optional Textbook(s) or Other References
None.

Supplies
Lab: Data log book (Composition/Quad ruled, 5 to 1”, sewn bond seam
F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Define states, processes, and cycles as per thermodynamics.
2. Demonstrate the ability to determine the properties utilized in thermodynamics of solids, liquids, and gases at various states.
3. Define and apply the First Law (or energy balance) to systems.
4. Define the Second Law and apply principles associated with it to systems.
5. Define and apply concepts of entropy to systems and devices.
6. Define and apply the various concepts of efficiency to devices and systems.
7. Apply the above to analyze gas power cycles, vapor power cycles, refrigeration cycles as used to model internal combustion engines, power cycles (turbines) as used in power plants, and refrigerator.

G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

Lectures, group discussions, home assignments, spreadsheet based calculations, textbook software for computer-aided solutions. The student is expected to have read/review the chapter before coming to the class.

H. **MAJOR COURSE REQUIREMENTS AND GRADING**

Assignment is based on student’s ability to apply core knowledge and principles as well as ability to identify and present and solve problems.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (2 @ 20% each)</td>
<td>40</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10</td>
</tr>
<tr>
<td>Homework, Attend, Other</td>
<td>5</td>
</tr>
<tr>
<td>Lab (Log book/quizzes (5%), mini-reports (10%), Project (10%))</td>
<td>25</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
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</table>
## I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>DATE (BY DAY OR WEEK)</th>
<th>Days/Date</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 27</td>
<td>Intro &amp; Chapt 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sep 1 &amp; 3</td>
<td>Chapt 1 &amp; Chapt 2</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>3</td>
<td>Sep 8 &amp; 10</td>
<td>Chapt 2 &amp; Chapt 3</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>4</td>
<td>Sep 15 &amp; 17</td>
<td>Chapt 3</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>5</td>
<td>Sep 22 &amp; 24</td>
<td>Review and Exam I(Sep 24)</td>
<td>HW, Exam</td>
</tr>
<tr>
<td>6</td>
<td>Sep 29 &amp; Oct 1</td>
<td>Chapt 4</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oct 6 &amp; 8</td>
<td>Chapt 5</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>8</td>
<td>Oct 13 &amp; 15</td>
<td>Chapt 6</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>9</td>
<td>Oct 20 &amp; 22</td>
<td>Chapt 6 Review</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>10</td>
<td>Oct 27 &amp; 29</td>
<td>Exam 2(Oct 27) Chapt 7</td>
<td>HW, Exam</td>
</tr>
<tr>
<td>11</td>
<td>Nov 3 &amp; 5</td>
<td>Chapt 7</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>12</td>
<td>Nov 10 &amp; 12</td>
<td>Chapt 7 &amp; Chapt 9</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>13</td>
<td>Nov 17 &amp; 19</td>
<td>Chapt 9 &amp; Chapt 10</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>14</td>
<td>Nov 24</td>
<td>Chapt 10 &amp; Chapt 11</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>15</td>
<td>Dec 1</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>FE</td>
<td>Dec 03</td>
<td>Final Exam: 1:45 to 4:15 pm</td>
<td></td>
</tr>
</tbody>
</table>

### TENTATIVE SCHEDULE For Laboratory

<table>
<thead>
<tr>
<th>Week</th>
<th>Days/Date</th>
<th>Topic</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 27</td>
<td>Intro to Lab, Lab safety</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sep 1 &amp; 3</td>
<td>Measurement basics, Instrumentation basics</td>
<td>Research report</td>
</tr>
<tr>
<td>3</td>
<td>Sep 8 &amp; 10</td>
<td>Lab exercise 1 (Temperature measurements part 1)</td>
<td>Quiz, Short report</td>
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<tr>
<td>4</td>
<td>Sep 15 &amp; 17</td>
<td>Lab exercise 2 (Temperature Measurements part 2)</td>
<td>Short report</td>
</tr>
<tr>
<td>5</td>
<td>Sep 22 &amp; 24</td>
<td>Lab exercise 3 (Non-contact temperature measurements)</td>
<td>Quiz.</td>
</tr>
<tr>
<td>6</td>
<td>Sep 29 &amp; Oct 1</td>
<td>Lab exercise 4 (Non-contact temperature measurements)</td>
<td>Report</td>
</tr>
<tr>
<td>7</td>
<td>Oct 6 &amp; 8</td>
<td>Digital measurements discussion</td>
<td>Quiz, Research report</td>
</tr>
<tr>
<td>8</td>
<td>Oct 13 &amp; 15</td>
<td>Digital lab exercise 1</td>
<td>Report</td>
</tr>
<tr>
<td>9</td>
<td>Oct 20 &amp; 22</td>
<td>Digital lab exercise 2</td>
<td>Quiz Report</td>
</tr>
<tr>
<td>10</td>
<td>Oct 27 &amp; 29</td>
<td>Design considerations/Project discussion</td>
<td>Quiz</td>
</tr>
<tr>
<td>11</td>
<td>Nov 3 &amp; 5</td>
<td>Project Proposal</td>
<td>Proposal rep</td>
</tr>
<tr>
<td>12</td>
<td>Nov 10 &amp; 12</td>
<td>Project</td>
<td>Prog report</td>
</tr>
<tr>
<td>13</td>
<td>Nov 17 &amp; 19</td>
<td>Project</td>
<td>Prog report</td>
</tr>
<tr>
<td>14</td>
<td>Nov 24</td>
<td>Project</td>
<td>Quiz, Final Report</td>
</tr>
<tr>
<td>15</td>
<td>Dec 1</td>
<td>Present project</td>
<td></td>
</tr>
</tbody>
</table>
Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

J. COURSE POLICIES

Attendance/Tardiness
Roll will be taken daily. Showing up to take the quiz and leaving will not count as attendance. Will be factored into grade at end of term.

Quizzes: Closed book/closed notes. Concept, vocabulary, brief workout, and problem set up based on examples from class and/or homework from previous week. Some may require calculators, some may not. Average of the quiz grades between each exam will be factored into the respective exam grade in a positive way. Quizzes will typically be given on the first class day of the new week.

Exams:
- Closed book and notes; materials will provided with regard needed equations or properties for the exam.
- Combination of concept questions (fill in blank, TF, multiple choice, short answer) and workout problems.
- Only calculators (recommend ones that can interpolate) are allowed. No smart devices, tablets, computers, etc are allowed.
- The final exam is comprehensive.
- Make up exams will only be allowed with a valid (university approved) excuse.

Assignments: due on Thursdays at the start of class. Multiple problems will be assigned. However, not all problems may be submitted for grading. It is important that the student looks at all problems in proper preparation for the exams/quizzes. Late submission will result in 10% penalty for every day the assignment is submitted late. HW cannot be submitted after the graded work has been returned to the class. The neater and more coherent the work, the better. See sample problem as provided in class and posted on BlackBoard for format.

Laboratory Format and Policy
The laboratory will be a mixture of lectures and lab activities. Students will be required to
- Apply appropriate safety practices at all times.
- Maintain a lab log book.
- Submit reports as specified by the instructor for the respective activity.
- Generate a project proposal regarding measurements and submit reports accordingly.
Attendance is mandatory

Late Work and Make-up Exams
Missed Exam & Quizzes
Make up exams will only be allowed with a valid (university approved) excuse. Exams need to be made up with one week from when exam was first administered
Make up quizzes will be at the discretion of the instructor if missed quiz does not fall under university approved absence. Make up quizzes will not be the same as what was given in class and need to be made up within one week from missed time.

**Late Homework:** Homework submitted late will be subjected to lowering of maximum points (1 day late, 15% off, 2 to 3 days late, 30% off, 4+ days late, 60% off). It is critical that students date their work upon submittal.

**Extra Credit**
No extra credit is planned at this time.

**Cell Phone/Smart Device Use**
Use of the phone during class can only be for emergency purposes only. If you have a possible need, alert instructor ahead of time. Family medical emergency could fall under this category. Research or job interview calls do not. Also, no recording of the lectures is allowed without express written consent of the instructor or expressed authorization by disability services.

**Laptop Use**
In general, use of laptop is not permitted during class unless instructed to.

**Food in Class**
No eating or drinking is permitted in class.

**Missed Exam**
Make up exams will only be allowed with a valid (university approved) excuse.

**Emailing:** Must use your Islander Email. Preferred contact is through Blackboard messaging. If emailing, must include course number and section in subject heading as well as purpose of email. Example: ENGR2316.001: Missed quiz 10.

**Participation**
Students are expected to play an active role in class in asking questions, answering questions.

**Safety**
The safety of students, faculty, staff and visitors to the ET laboratories is a major issue. You must follow safety procedures and use personal protective equipment as required. Skate boards and other large cumbersome equipment needs to be kept in the front of the room. All walkways must be kept clear.

**Others**
Blackboard will be used through the semester to provide access to notes, example problems, and notifications regarding quizzes, homework, exams, projects, and so forth. Folders for
group projects will be provided on Blackboard so that files can be shared as well as submitted.

K. COLLEGE AND UNIVERSITY POLICIES

- **Academic Integrity (University)**
  University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

- **Classroom/Professional Behavior**
  Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

- **Statement of Civility**
  Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

- **Deadline for Dropping a Course with a Grade of W (University)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.
• **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

• **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

• **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

**L. OTHER INFORMATION**
• **Academic Advising**
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

**GENERAL DISCLAIMER**

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.